ESSENTIALS of BEHAVIORAL RESEARCH: *Methods and Data Analysis*

行为研究纲要：方法与数据分析

第3版 · 美文注释版

[美] 罗伯特·罗森塔尔（Robert Rosenthal）
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内容提要

这是一本经典的高级研究方法教材。两位作者分别用几十年的时间从事心理学教学和研究工作，其研究重心又集中在心理学研究方法和数据分析方面。他们在这方面进行了深入钻研和分析，并结出了丰硕的成果，共同合作出版了多本关于研究方法和数据分析的著作。

《行为研究纲要》这本著作的前半部分着重于研究方法的论述，涉及基础概念和基本伦理、因变量的操作和测量以及研究设计的逻辑；后半部分着重于描述高级统计过程，包括四个部分：数据分析基础、单因素设计、因素设计以及数据分析的其他问题。附录中还包括书中用到的公式、常用统计图表、术语及参考文献。

本书是心理学、社会学、人类学、传播学、教育学、商学、统计学、市场营销学等多个学科领域的教师、学者和学生从事教学和研究工作所必备的一本工具书。

To our students past, present, and future

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ABOUT THE AUTHORS
关于作者

Robert Rosenthal **Ralph Rosnow**

Photo by Mimi Rosnow.

Robert Rosenthal is Distinguished Professor at the University of California at Riverside and Edgar Pierce Professor of Psychology, Emeritus, Harvard University. His research has centered for some 50 years on the role of the self-fulfilling prophecy in everyday life and in laboratory situations. Special interests include the effects of teachers' expectations on students' performance, the effects of experimenters' expectations on the results of their research, and the effects of clinicians' expectations on their patients' mental and physical health. He also has strong interests in sources of artifact in behavioral research and in various quantitative procedures. In the realm of data analysis, his special interests are in experimental design and analysis, contrast analysis, and meta-analysis. His most recent books and articles are about these areas of data analysis and about the nature of nonverbal communication in teacher-student, doctor-patient, manager-employee, judge-jury, and psychotherapist-client interaction. He has been Co-Chair of the Task Force on Statistical Inference of the American Psychological Association and has served as Chair of the Research Committee of the Bayer Institute for Health Care Communication. He was a co-recipient of two behavioral science awards of the American Association for the Advancement of Science (1960, 1993) and recipient of the James McKeen Cattell Award of the American Psychological Society, the Distinguished Scientist Award of the Society of Experimental Social Psychology, the Samuel J. Messick Distinguished Scientific Contributions Award of the APA's Division 5—Evaluation, Measurement, and Statistics, and the APA's Distinguished Scientific Award for Applications of Psychology.

Ralph L. Rosnow is Thaddeus Bolton Professor Emeritus at Temple University, where he taught for 34 years and directed the graduate program in social and organizational psychology. He has also taught research methods at Boston University and Harvard University and does consulting on research and data analysis. The overarching theme of his scholarly work concerns how people make sense of, and impose meaning on, their experiential world, called the "will to meaning" by Viktor Frankl. Rosnow has explored aspects of this construct in research and theory within the framework of contextualism, the psychology of rumor and gossip, attitude and social cognition, the structure of interpersonal acumen, artifacts and ethical dilemmas in human research, and the statistical justification of scientific conclusions. He has authored and coauthored many articles and books on these topics and, with Mimi Rosnow, coauthored *Writing Papers in Psychology,* a popular writing manual now in its seventh edition (published by Thomson Wadsworth, 2006). He has served on the editorial boards of journals and encyclopedias, was coeditor (with R. E. Lana) of the Reconstruction of Society Series published by Oxford University Press, and chaired the APA's Committee on Standards in Research. He is a fellow of the American Association for the Advancement of Science, the APA, and the Association for Psychological Science, received the Society of General Psychology's George A. Miller Award, and was recently honored with a Festschrift book edited by D. A. Hantula, *Advances in Social and Organizational Psychology* (Erlbaum, 2006).

Rosenthal and Rosnow have also collaborated on other books on research methods and data analysis, including *Artifact in Behavioral Research* (Academic Press, 1969); *The Volunteer Subject* (Wiley, 1975); *Primer of Methods for the Behavioral Sciences* (Wiley, 1975); *Understanding Behavioral Science: Research Methods for Research Consumers* (McGraw-Hill, 1984); *Contrast Analysis: Focused Comparisons in the Analysis of Variance* (Cambridge University Press, 1985); *People Studying People: Artifacts and Ethics in Behavioral Research* (W. H. Freeman, 1997); (with D. B. Rubin) *Contrasts and Effect Sizes in Behavioral Research: A Correlational Approach* (Cambridge University Press, 2000); and *Beginning Behavioral Research: A Conceptual Primer* (6th ed., Pearson/PrenticeHall, 2008).

PREFACE
前　言

The first edition of *Essentials of Behavioral Research* was published by McGraw-Hill in 1984 and the second edition in 1991. When we were asked about a third edition, our answer was generally, "We're thinking about it." We were working on other related projects, and our conceptual thinking about research methods and data analysis had been continually evolving. Some of that work we had published in journal articles and invited chapters, and for several years we had been writing another book: *Contrasts and Effect Sizes in Behavioral Research: A Correlational Approach* (Rosenthal, Rosnow, & Rubin, 2000). As we had also written an undergraduate text, *Beginning Behavioral Research: A Conceptual Primer,* we thought that the next edition of *Essentials* should be clearly addressed to graduate students, researchers, and occasional advanced undergraduates for whom *Beginning Behavioral Research* was a journey begun rather than a journey completed. We have had occasion for over 30 years to teach methods and data analysis not only to students in clinical, cognitive, developmental, experimental, organizational, personality, and social psychology, but also to some in biology, education, communication research, school psychology, business, statistics, and marketing. Thus, we wanted the third edition of *Essentials* to be useful to a wide variety of graduate students and researchers.

As a consequence, there is a great deal that is new to this edition of *Essentials,* including new and deeper discussions of methodological and philosophical issues, and of data analytic issues that were of only passing interest to behavioral researchers in 1991. Nonetheless, we continue to review elementary topics and basic concepts as a brushup for students who have been away from these areas or have had limited exposure to them. These reviews are conceptually integrated with recent developments. As in the previous editions, our approach to data analysis continues to be intuitive, concrete, and arithmetical rather than rigorously mathematical. When we have a mathematically sophisticated student, we encourage her or him to take additional course work in a department of mathematical statistics. We still advise such a student to read this book, as our approach will prove complementary, not redundant or contradictory. As a pedagogical aid, the statistical examples that we use are in most cases

hypothetical, constructed specifically to illustrate the logical bases of computational procedures. The numbers were chosen to be clear and instructive, and therefore they are neater than those found in most actual data sets. Readers who are familiar with the primary literature of the behavioral sciences know that most real-world examples involve more observations than are found in our hypothetical cases, and all readers should keep this fact in mind.

The material on data analysis in this edition of *Essentials* reflects much of the spirit, and much of the substance, of the report of the Task Force on Statistical Inference of the Board of Scientific Affairs of the American Psychological Association (Wilkinson & Task Force on Statistical Inference, 1999). There is, for example, a new emphasis on the reporting and interpretation of confidence intervals. Although previous editions of *Essentials* emphasized effect size estimates, we have added greater differentiation among effect sizes, for example, among the different types of correlational effect sizes such as r_{alerting}, r_{contrast}, $r_{\text{effect size}}$, and r_{BESD}. For still another example, we continue to illustrate computations by simple calculators in order to facilitate a deeper understanding of the statistical procedures that in readers' research will typically be computer-based. Such deeper understanding permits the researcher to check very roughly the accuracy of computer output by intelligent "guesstimates" and, if discrepancies are detected, to check the results against those provided by another program. As a final example, our newly added material on the complex issue of drawing causal inference includes not only its conceptual basis, but also a simple illustration of the use of Donald Rubin's propensity scores to draw causal inference when random assignment is not possible. These are only some examples of how this new edition of *Essentials* and its authors have benefited from the work of the APA Task Force. That benefit was increased by the opportunity of the first author to serve as co-chair of the Task Force (along with the late Robert Abelson and the late Jacob Cohen).

In addition to the examples listed above, there are many further changes and additions in this new edition of *Essentials*. Examples include new material on test validity, the reliability of items and judgments, the construction of composite variables, strategies for dealing with missing data, the use of bootstrapping and jackknifing, the design and analysis of hierarchically nested designs, and a recently developed effect size estimate for multiple-choice-type data. There is also a new discussion of epistemological issues in human subjects research, focusing on three current perspectives and their limitations. The discussion of ethical guidelines emphasizes the delicate balancing act involved in dealing with moral and methodological imperatives. We also discuss ideas and methods that, although frequently cited or used by behavioral researchers, are limited in ways that appear to be unfamiliar to many users. We hope the tone and writing style of these critical discussions will be perceived as respectful, clear, and explanatory, and that readers will find this edition of *Essentials* a more integrated synthesis of research methods and data analysis than the previous two editions.

The American Psychological Association's (2001) publication manual is generally acknowledged to be the arbiter of style for many journals in our field, so we assume that researchers will usually consult the most recent edition of the APA manual. For students who are not writing for publication but are writing a research proposal or report for a course assignment or creating a poster or a brief summary of research

findings to serve as a handout, there are guidelines and tips in Rosnow and Rosnow's *Writing Papers in Psychology: A Student Guide to Research Reports, Literature Reviews, Proposals, Posters, and Handouts.*

Certain tables (noted in the text) have by permission been reproduced in part or in their entirety, for which we thank the authors, representatives, and publishers cited as sources in footnotes.

The authors thank Margaret Ritchie for her outstanding copy editing and we thank Mike Sugarman, our McGraw-Hill Sponsoring Editor, Katherine Russillo, our Editorial Coordinator, and Jean Starr, our Project Manager, for making it easier to tackle a project of this size.

We also thank William G. Cochran, Jacob Cohen, Paul W. Holland, Frederick Mosteller, and Donald B. Rubin, who were influential in developing our philosophy of research in general and data analysis in particular.

We are grateful to the following reviewers whose insights and suggestions were so helpful in preparing this edition of *Essentials:* Nicholas DiFonzo, Rochester Institute of Technology; Morton Heller, Eastern Illinois University; Scott King, Loyola University at Chicago; Donna Lavoie, St. Louis University; Pascale Michelon, Washington University at St. Louis; Robert Pavur, University of North Texas; Daniel Read, University of Durham, UK; and Linda Tickle-Degnen, Tufts University.

Thanks to MaryLu Rosenthal for indexing and many other special contributions that made the completion of the project a reality. And finally, we thank MaryLu Rosenthal and Mimi Rosnow for constructive feedback and counseling in ways too numerous to mention.

This is our 16th book together, and we have had terrific fun throughout the course of this 40-year-long collaboration!

Robert Rosenthal
Ralph L. Rosnow

CONTENTS
目　录

Preface xix

第一编 概念与伦理基础
PART I CONCEPTUAL AND ETHICAL FOUNDATIONS 1

第 1 章 行为研究的精神
Chapter 1 The Spirit of Behavioral Research 3

Science and the Search for Knowledge 3
What Do Behavioral Researchers Really Know? 6
Social Constructionism 7
Contextualism/Perspectivism 9
Evolutionary Epistemology 12
Peirce's Four Ways of Knowing 13
Rhetoric, Perceptibility, and Aesthetics 15
Limitations of the Four Supports of Conviction 18
Behavioral Research Defined 18
Three Broad Research Orientations 21
The Descriptive Research Orientation 23
The Relational Research Orientation 25
The Experimental Research Orientation 29
Empirical Principles as Probabilistic Assertions 32
Orienting Habits of Good Scientific Practice 34

第 2 章 探索与辩护的环境
Chapter 2 Contexts of Discovery and Justification 37

Inspiration and Explanation 37
Theories and Hypotheses 38
Sources of Inspiration and Insight 39
Serendipity in Behavioral Research 42
Molding Ideas Into Working Hypotheses 43

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Positivism, Falsificationism, and Conventionalism 48
Type I and Type II Decision Errors 53
Statistical Significance and the Effect Size 55
Two Families of Effect Sizes 56
Interval Estimates Around Effect Sizes 58
Summing Up 59

第 3 章 伦理问题、道德两难问题与指导方针
Chapter 3 Ethical Considerations, Dilemmas, and Guidelines 61

Puzzles and Problems 61
A Delicate Balancing Act 63
Historical Context of the American Psychological Association Code 64
The Belmont Report, Federal Regulations, and the Institutional Review Board 67
Principle I: Respect for Persons and Their Autonomy 69
Principle II: Beneficence and Nonmaleficence 71
Principle III: Justice 74
Principle IV: Trust 76
Principle V: Fidelity and Scientific Integrity 77
Costs, Utilities, and Institutional Review Boards 79
Scientific and Societal Responsibilities 82

第二编 因变量的可操作化和可测量化
PART II OPERATIONALIZATION AND MEASUREMENT OF DEPENDENT VARIABLES 85

第 4 章 测量信度和效度
Chapter 4 Reliability and Validity of Measurements 87

Random and Systematic Error 87
Assessing Stability and Equivalence 89
Internal-Consistency Reliability and Spearman-Brown 92
KR20 and Cronbach's Alpha 94
Effective Reliability of Judges 98
Effective Cost of Judges 100
Effective Cost of Items 102
Interrater Agreement and Reliability 103
Cohen's Kappa 105
Replication in Research 111
Validity Criteria in Assessment 113
Convergent and Discriminant Validity 115
Test Validity, Practical Utility, and the Taylor-Russell Tables 117
Relationship of Validity to Reliability 119

第 5 章 观察、判断和复合变量
Chapter 5 Observations, Judgments, and Composite Variables 123

Observing, Classifying, and Evaluating 123
Observing While Participating 124

Maximizing Credibility and Serendipity 125
Organizing and Sense-Making in Ethnographic Research 127
Interpreter and Observer Biases 128
Unobtrusive Observations and Nonreactive Measurements 130
Selecting the Most Appropriate Judges 134
Choosing the Number of Response Alternatives 137
Effects of Guessing and Omissions on Accuracy 138
Intrinsic Factors and the Level of Accuracy 140
Applications of Categorical Judgments 141
Category Scales and Rating Scales 145
Numerical, Graphic, and Magnitude Ratings 146
Rating Biases and Their Control 150
Bipolar Versus Unipolar Scales 151
Forming Composite Variables 151
Forming Multiple Composites 154
Quantifying the Clarity of Composites 156

第 6 章 问卷法、访谈法和日志法
Chapter 6 Questionnaires, Interviews, and Diaries 160

Concerns About Self-Report Data 160
Open-Ended Versus Structured Items 163
Critical Incident Technique 165
Stages in Developing Interview Protocols 167
Research Interviews by Telephone 171
Developing Research Questionnaires 172
Defensiveness, Inconsistency, and Yea-Saying 174
Cross-Cultural Questionnaire and Interview Research 176
One-Dimensional and Multidimensional Attitude Scales 177
Semantic Differentials for Attitudinal Meaning 178
Q-Sorts for Subjectivity Ratings 179
Likert Method of Item Analysis 181
Thurstone Equal-Appearing Intervals Method 182
Memory and the Use of Self-Recorded Diaries 185

第三编 研究设计的逻辑
PART III THE LOGIC OF RESEARCH DESIGNS 187

第 7 章 随机控制的实验和因果推论
Chapter 7 Randomized Controlled Experiments and Causal Inference 189

Experimentation in Science 189
Randomized Experimental Designs 190
Characteristics of Randomization 193
The Philosophical Puzzle of Causality 196
Contiguity, Priority, and Constant Conjunction 198
Four Types of Experimental Control 200
Mill's Methods of Agreement and Difference 201
Between-Group Designs and Mill's Joint Method 203

Independent, Dependent, and Moderator Variables 204
Solomon's Extended Control Group Design 206
Threats to Internal Validity 209
Threats to External Validity 212
Statistical Conclusion and Construct Validity 215
Subject and Experimenter Artifacts 216
Demand Characteristics and Their Control 220
Interactional Experimenter Effects 223
Experimenter Expectancy Effects and Their Control 226
Concluding Commentary 230

第 8 章 非随机化研究与函数关系
Chapter 8 Nonrandomized Research and Functional Relationships 233

Nonrandomized and Quasi-Experimental Studies 233
Nonequivalent Groups and Historical Controls 235
Interrupted Time Series and the Autoregressive Integrated Moving Average 238
Single-Case Experimental Designs 239
Cross-Lagged Correlational Designs 242
Invisible Variables and the Mediation Problem 245
Path Analysis and Causal Inference 246
The Cohort in Longitudinal Research 250
Different Forms of Cohort Studies 252
Subclassification on Propensity Scores 256
Multiple Confounding Covariates 257

第 9 章 随机与非随机抽取样本
Chapter 9 Randomly and Nonrandomly Selected Sampling Units 260

Sampling a Small Part of the Whole 260
Bias and Instability in Surveys 262
Simple Random-Sampling Plans 264
Improving Accuracy in Random Sampling 266
Confidence Intervals for Population Estimates 269
Speaking of Confidence Intervals 270
Other Selection Procedures 271
Nonresponse Bias and Its Control 273
Studying the Volunteer Subject 276
Characteristics of the Volunteer Subject 278
Implications for the Interpretation of Research Findings 284
Situational Correlates and the Reduction of Volunteer Bias 285
The Problem of Missing Data 288
Procedures for Dealing With Missing Data 289

第四编 数据分析的基本原理
PART IV FUNDAMENTALS OF DATA ANALYSIS 291

第 10 章 描述、展示以及探究数据
Chapter 10 Describing, Displaying, and Exploring Data 293

Descriptions of Sampling Units 293
Frequency Diagrams and Stem-and-Leaf Displays 294
Box Plots 297
Comparing Distributions Back to Back 298
Measures of Central Tendency 299
Measures of Spread 300
The Normal Distribution 304
Standard Scores 305
Data Not Distributed Normally 306
Precision of Estimating Population Means 307
Defining Outliers 309
Coping With Outliers 310
Exploring the Data 311

第 11 章 相关关系
Chapter 11 Correlation 314

Pearson r 314
Proportion of Variance Interpretation of Correlation 316
Binomial Effect-Size Display 318
Confidence Intervals for Effect-Size Correlations 322
Small Correlations, But Important Effects 324
Counternull Values of Effect Sizes 328
Spearman Rank Correlation 330
Ranks as a Transformation 332
Observations of Disproportionate Influence 333
Point-Biserial Correlation 336
Exact Tests for Rho 339
Phi Coefficient 340
Curvilinear (Quadratic) Correlation 344
Five Product-Moment Correlations 346
Comparing Correlations 347
Considering Third Variables 347
Effects of Variability on Correlations 349

第 12 章 统计检验力与效应值
Chapter 12 Statistical Power and Effect Size Revisited 354

Why Assess Statistical Power? 354
The Neglect of Statistical Power 357
The $r_{equivalent}$ Statistic 359
Cohen's Multipurpose Power Tables 360
The t Test for Comparing Two Means 363
The Significance of a Product-Moment r 366
Differences Between Correlation Coefficients 369

The Test That a Proportion is .50 373
The Difference Between Proportions 373
The Focused Chi-Square Test 374
F Tests for Focused Comparisons 375
Additional Strategies for Improving Power 376

第五编 单因素设计
PART V ONE-WAY DESIGNS 379

第 13 章 用 *t* 检验比较均值
Chapter 13 Comparing Means by Standard *t* Tests 381

Gosset and the *t* Test 381
Two Components of *t* Tests 382
Maximizing *t* 383
Effect Sizes and Adjustments for Unequal Sample Sizes 385
Interpreting the Independent Sample *t* 388
Computing the Independent Sample *t* 391
Reporting the Results 392
t Tests for Nonindependent Samples 395
Effect Size and Study Size Components of Nonindependent Sample *t* 397
Assumptions Underlying *t* Tests 401
Nonparametric Procedures 403
The Bootstrap, the Jackknife, and Permutation Tests 405

第 14 章 方差分析与 *F* 检验
Chapter 14 Analysis of Variance and the *F* Test 409

The *F* Test and the *t* Test 409
The Analysis of "Variances" 410
Illustration of an Omnibus *F* 412
Dividing Up the Total Variance 413
ANOVA Summary Tables 414
Distributions of *F* 417
After the Omnibus *F* 418
Protecting Against "Too Many *t* Tests" 421
Bonferroni Procedures 422
Bonferroni Tolerance Value 425
Comparing Two Independent Variabilities 425
Illustration Using Transformations 426
Comparing Two Correlated Variabilities 429
Comparing Three or More Independent Variabilities 431
Comparing Three or More Correlated Variabilities 433
Summary of Procedures for Comparing Variabilities 433

第 15 章 单因素对比分析
Chapter 15 One-Way Contrast Analyses 434

Focusing Our Questions and Statistical Tests 434
Contrast *F* Tests on Original Data 436
Contrast *t* Tests on Original Data 440

Carving Contrasts Out of Published Data 440
Orthogonal Contrasts 442
Nonorthogonal Contrasts 444
Effect Size Indices for Contrasts 445
The BESD and the Binomial Effect-Size Correlation 448
Overview of the Four Effect-Size Indices 451
Comparing Competing Contrasts 453
Combining Competing Contrasts 455
Optimal Design and the Allocation of Sample Sizes 456

第六编 因素设计
PART VI FACTORIAL DESIGNS 459

第 16 章 多因素方差分析
Chapter 16 Factorial Analysis of Variance 461

Confronting Persistent Misunderstandings 461
An Economy of Design 464
Effects and the Structure of ANOVA 465
Individual Differences as Error 468
The Table of Variance 470
Testing the Grand Mean by t and F 472
Unweighted Means Analysis for Equal or Unequal Sample Sizes 475
Effects on F of Unequal Sample Sizes 478
Unequal Sample Sizes and Contrasts 480
Transcending Factorial Structure Using Contrasts 482
Higher Order Factorial Designs 484
Blocking and the Increase of Power 489
Blocking and the Analysis of Covariance 493
Transforming Data to Remove Interactions 495

第 17 章 方差分析中的交互作用
Chapter 17 Interaction Effects in Analysis of Variance 499

The Interpretation of Interaction 499
Crossed and Uncrossed Combinations of Group Means 501
Illustration of Mean Polishing 504
Constructing Tables of Predicted Means 506
Studying Interactions in Two-Way Tables 510
Three-Way Factorial Designs 513
Defining Three-Way Interactions 515
Further Notes on Interpretation 517
Simplifying Complex Tables of Residuals 522
Illustration of a Five-Way Interaction 524
A Note on Complexity 526

第 18 章 重复测量方差分析
Chapter 18 Repeated Measures in Analysis of Variance 527

Use of Repeated Observations 527
Basic Computations 528
Fixed and Random Effects 530

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